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THE NAVAL AVIATION SAFETY REVIEW



1989

CNO Safety Awards

COMNAVAIRESFOR

VF-202**
VAW-88
VR-51
VFA-303*
VP-65
HM-18

CNATRA

VT-10*
VT-2
VT-22
VT-31*
HT-18
VT-26

FMFLANT

VMA (AW)-332
VMFA-451*
VMA-331
HMM-266
HMM-263
VMGR-252

COMNAVAIRPAC

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VA-97
VA-185
VAQ-136
VAQ-137
VFA-113
VA-122
VQ-3
HM-15
VS-21
VAW-114*
VP-1
HS-14
HSL-33
HSL-47
VC-1*
HC-11

COMNAVAIRLANT

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VFA-106
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VA-36
HC-16*
VP-26
VS-31
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HS-11
VX-1*
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HSL-32
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FMFPAC

VMFA (AW)-121
HMLA-369
VMFA-531
VMFA-212
HMM-163
PSD-12
VMFA-232
HMH-463

CG Fourth MAW

VMFA-321
HML-767

NAVAIRSYSCOM

NAVAIRTESTCEN PATUXENT RIVER MD

Admiral James H. Flatley Memorial Awards

USS Enterprise (CVN-65)

USS Nassau (LHA-4)

*Second consecutive year

**Third consecutive year

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Aborted Takeoffs:

The Hard Way

By Lt. Michael A. Yukish

2 I WAS taking off on a wet runway. I was at takeoff reference speed (Vref), but 10 knots short of rotation speed (Vro), all systems go. My copilot, a senior carrier aircraft plane commander (CAPC) playing foil to my junior Null-P status, looked at me and said, "Go-speed." He yanked my right power lever back to flight idle. Oh, no! The dreaded simulated-engine-failure at Vgo (go-speed), my squadron's favorite emergency.

Let's see, I've just passed Vgo, I'm committed to takeoff. I'm expected to get the plane flying. Right? Wrong. I pulled the left power lever back into ground range and aborted the takeoff. Then the fun began.

Although this incident happened four months after I checked into my squadron, the groundwork had been laid the day I arrived. The squadron had a reputation for being real uptight, by the book. They had already brow-beaten a number of pilots into submission. I was next. The only thing was, I did not see it that way. In my mind I was a fleet pilot, a hacker. I'd mastered Turbo-weenies at Whiting, planted my Tubby-2 on the heaving deck of the *Lexington*, and taught P-3 pilots how to fly the ball in a T-44 Doubleweenie. I had even graced the carrier with my ace night passes in a RAG E-2C.

The skipper's a tough nut? So what? I'm a fleet pilot! Let's see, what do I need for CAPC, 700 hours? Hey, Skipper, it's all over but the flight time, right? I got my wings, I'm good to go. Just give me the keys and point me in the right direction. However, when I arrived, I noted a different attitude toward me. It ranged somewhere between "new meat" and "someone else to take the heat."

The more senior pilots saw me as a formless, shapeless lump of putty that they had a divine duty to whip into their vision of an aviator. The JOs' attitude was quite a bit different but no less comforting.

"Boy, am I glad you're here!" exclaimed the now-second-most-junior pilot. More comments followed such as "You'll love flying with the skipper!" and "I did my time."

Sure enough, on my very first left-seat hop with the skipper, he simulated an engine failure just past refusal speed. I hacked it, albeit ungracefully. I pumped those rudder pedals for all I was worth, surely bouncing the poor air control officer's head off the porthole on one side and the main display unit on the other. The plane walloped its way into the air. I raised the gear, and we were flying. The result was that I proved to the skipper, and more importantly to myself, that I could handle the most severe engine failure successfully. This was undoubtedly the skipper's intention.

Unfortunately, I also began to develop a deep distrust of my copilot, which was not so good. The die had been cast on that first flight which turned out to be typical. In my mind, the pilot and copilot came to be adversaries. The typical cockpit gouging session consisted of my copilots proving how little I knew. I watched them like a hawk for indications of pulled CBs, simulated engine failures, and any other general mayhem they could provoke. I did not trust them, and therefore, I certainly did not enjoy flying with them.

On the plus side, I learned to keep my scan going, and to not relax in the cockpit. At any moment, I fully expected to experience an emergency, whether real or copilot-induced. On the minus side there was a breakdown in cockpit communication. I never trusted anything they said or did since I knew it would be an attempt to trip me up. I never asked questions for fear of starting a gouge-a-thon session where we would probe the depths of my lack of knowledge. Every question was answered by "I don't know, you tell me." My interest in NATOPS waned with my interest in flying, greatly exacerbating the situation. As they got madder, I got more and more bummed.

One weekend, I finally had a good deal come up, a cross-country to NAS Pensacola. I had already been there twice on out-and-ins. Now I would get to spend a few nights. Great! Unfortunately, the CAPC I was to go with decided that I had not adequately prepared for the upcoming flight. No idea of weather, no route figured, etc. He told me that I would be right seat the whole time, as punishment. I did my copilot stint effectively enough on the way down.

Once there, I prepared a comprehensive flight plan for

The Briefing



The E-2C is a two-pilot airplane. The last thing you want in a cockpit is two pilots who don't like each other, don't trust each other or don't talk to each other.





the trip home a day in advance, to my CAPC's satisfaction. The day of the flight home, we walked out to preflight. As copilot, I started around the back of the airplane.

"Where are you going?" my pilot asked.

"I'm the copilot, aren't I?" I replied.

"Naw, you can have the left seat."

I should have said "No, thanks, I'm not prepared," but I wasn't about to turn down the chance. The fact is I wasn't prepared mentally. I hadn't thought about a cockpit coordination brief at all. I gave a quick brief, and we started up. We didn't mention anything about simulated engine emergencies.

We taxied to the runway, one that I was unfamiliar with. The surface of the runway was still wet from an early morning rain. Cleared for takeoff, I smoothly advanced the power levers and released the brakes. We were off. You know what happened next. The moment I aborted instead of continuing the takeoff, the simulated emergency should have been over, but it wasn't. The CAPC had pulled the right power lever back to flight idle. In my mind it was his power lever. I pulled the left one back to max reverse, as I went over the NATOPS abort procedures in my mind.

"Power-flt idle, fx-affected engine, power-grd idle, flaps-up," I said to myself. To simulate feathering the right engine I should have brought it back to ground idle. I didn't. Neither did I tell the CAPC to do it. In fact, while I was battling snakes in the cockpit he didn't say anything to me. We both knew that I'd goofed and that didn't help. With one engine providing forward thrust at flight idle and the other at max reverse, I had quite a bit of power differential.

At first there was plenty of rudder authority to counteract it, but as I slowed, a left drift developed. The runway fell away in a mild slope which hid the end from sight, so I did not know how much runway I had left.

To arrest my drift and expedite stopping the aircraft I applied differential braking at about 60 knots. The plane swerved back over to centerline. I felt some loss of control as the right tire either hydroplaned or skidded on the wet asphalt. At this point we were along for the ride. Luckily, the plane stopped basically pointing in the right direction and in the right spot, with 500 feet remaining. I looked down, saw the right power lever was at flight idle, muttered a few epithets to myself, and pulled it back.

Tower called to tell us that we had pulled the long field gear out of battery on our rollout. As we started our back-taxi, it became immediately apparent that either the plane had a flat spot on the right tire, or we had a square wheel. This problem verified that I had locked up the right brake in my attempt to stop, pulling the gear out of battery as I crossed it. The CAPC threw me out of the left seat and flew the plane home.

I learned a lot from that incident and all that led up to it. It affects how I treat our junior pilots now that I am a CAPC (yes, I made it). The gains from springing such a severe emergency as an engine failure at Vgo totally unannounced, unexpected and unbriefed, are not worth the danger it puts your crew in. The potential for leaving the runway and hitting an obstruction such as an arresting gear engine was very, very real.

The E-2C is a two-pilot airplane. As such, it requires coordination between pilot and copilot, which also requires communication and trust. The last thing you want in a cockpit is two pilots who don't like each other, don't trust each other or don't talk to each other. Work to make the crew partners, not adversaries.

The CAPC is a teacher. All the NATOPS in the world isn't going to complete a junior pilot's training. What the junior pilot needs is the CAPC's hard-earned knowledge. He needs the sea stories and "There I was" yarns to make the NATOPS come to life, and show why you need to know that book. *It behooves the CAPC to offer the information, rather than waiting to be asked.* The knowledge passed will make the junior pilot a little smarter, and that is the goal. And if that doesn't work, well then, you can take your kneeboard and start putting dents in his helmet.

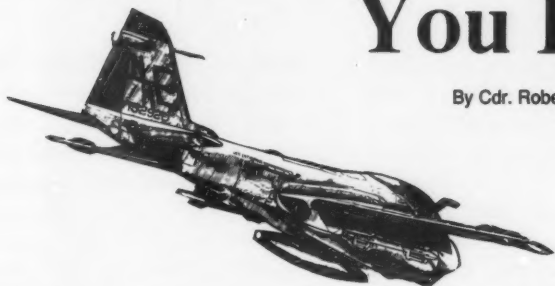
I now know that on a wet runway, past Vref, you can stop an E-2C with max reverse on one engine and flight idle on the other using rudder and differential braking only. If I was to do a single-engine landing or an abort without arresting gear, I would now have no qualms about using max reverse on the good engine during the initial portion of the rollout. This would maximize the deceleration and greatly decrease stopping distance.

How's that saying go? Use superior headwork to keep yourself from situations requiring superior airwork? It's the truth!

LT Yukish is the Pilot NATOPS and Pilot Training Officer for VAW-123.

The Briefer Knows Something You Don't

By Cdr. Robert Willard



A HUSH falls over the ready room as the briefer steps up to the podium. It's a complex mission – multiplane and many orange forces. It includes an intricate launch-and-rendezvous sequence and an equally difficult recovery. Aircraft will ingress and egress at the highest possible speeds, and the fighting will be furious.

The briefer scans his audience. He's seen it before. The faces are young and attentive, with fewer cats and traps, fewer Gs, but anxious to establish themselves as sierra hotel. They'll get their chance today – the hard way. He knows something they don't.

For each aircraft, the events will go like this:

- Man-up
- Start
- Case 1 launch
- Rendezvous and tank
- Proceed to station
- High-speed intercept (fighters), high speed ingress to target (bombers)
- High allowable risk engagement
- High-speed egress
- Case 3 recovery

The briefer lays out the mission objectives in a rather unusual format. He sees the quizzical looks from some of the aircrews. At least they're listening. He hopes they heed his warnings. The goals of the mission include: instantaneously recognizing a deteriorating situation, and responding in the proper sequence without hesitation. The aircrews must know their aircraft cold, their personal limitations, and they must not clutch.

The briefer knows that the aircrews will encounter potential catastrophes during today's mission; they *don't* know that:

- A right engine will fail during the cat stroke.
- Another engine will sustain a major compressor stall during launch.
- While proceeding to station or rendezvous point, an emergency will occur forcing the crew to abort and return for an emergency pull-forward.

- During a supersonic intercept, an engine will have a compressor stall.
- One F-14 will experience a near midair with a bogey that won't back off.
- Two A-6s will have a near midair in the target area.
- In the midst of the engagement, a Tomcat will depart controlled flight.
- One aircraft will face a single-engine landing.

To recognize a deteriorating situation, aviators must know what to look for. Some of the cues are visual, some audible and some involve the "feel" of the aircraft. Most impending catastrophes involve multiple cues. For example, a compressor stall during a catapult launch will likely be a loud bang. A stall warning light and aural tone should be triggered, and at the instant the aircraft becomes airborne, the pilot will probably sense a lack of acceleration and climb, and the aircraft may settle. The aircraft will yaw, then slow roll, into the stalled engine. The pilot's response must be exact.

Take a moment to review the emergency list. Consider how much time you have to react. Review what you know about immediate-action procedures.

During the briefer's career, he has encountered every one of these emergencies. He knows that many in his audience will, too. He knows that many aircraft have been lost to each of these emergencies, and that many aircrews died because they didn't recognize their problems and react properly. He knows there's more to a hop than the mission. Cdr. Willard is an F-14 pilot and the CO of VF-51.



Nugget Indoc

By LCdr. C.E. Lindstrand



AFTER a boring four-day cross-country drive, we entered our new home. Confusion reigned. Cruise boxes were stacked everywhere with sailors and pilots scurrying around like termites. In fact, the squadron was preparing to deploy for the second phase of work-ups. Outstanding! We'll soon be bagging traps and showing off all the stuff we know about shipboard ops.

The Skipper gave us a stirring welcome-a-board speech, then we reported to the Ops Officer.

"Welcome aboard! I hope you guys are ready to work. These are your NATOPS manuals, CVW tacnotes, a tactical manual, local operating procedures manual, CV and LSO NATOPS manuals, squadron SOP, a briefing guide, low-level procedures, and an AGM-88 HARM OTG." He gave us the books and continued.

"Tomorrow, you've got open-and closed-book tests on NATOPS, tacnotes and course rules, a TACMAN review, and an LSO brief. Be ready for an emergency procedures simulator, HARM and FLIR training, and a fam-FCLP hop. Any questions?"

No problem, I figured. We would put in a little studying that night after the movers delivered our household goods.

Our first brief was long. What we thought would be a chance to dazzle the CO with our knowledge ended with us listening humbly to a lecture on course rules at a new, unfamiliar

field. Also, it was going to be the first time we had flown our A-7s through clouds. The weather out west had been nice the entire time we had been in the RAG.

We climbed out on the Skipper's wing. Predictably, his radios quit halfway through the flight, necessitating a twilight, IFR recovery to a strange field with the CO as our wingman. After we dropped him off, we got to land on an 8,000-foot runway. We were used to 14,000-foot strips.

Things began to smooth out over the next few days. We flew each day and became comfortable at our home field. Then, the reality of shipboard ops hit us. When we had CQ'd in the RAG and training command, our only concern was landing safely and rotating off the cat. Aircraft configurations were simple; all our birds were slick. Now, we had to think about high-drag counts with extra gas, FLIR pods, bombs, racks and ECM gear.

We learned valuable lessons the hard way, such as checking for half flaps on high-gross-weight cat shots. One of us actually tried to get the weight board changed from 35K (actual weight) to 27K (normal CQ weight). Another got a soft cat shot after neglecting to add an extra 2,000 pounds to the weight chit for a full drop-tank. We thought that once we were airborne, things would lighten up, right? Wrong!

I wished I had asked more ques-

tions during the brief when I had the chance. Rendezvousing on a lead you can't find is hard . . . damn EMCON procedures! To top things off, I had to listen to the LSOs describe my landings. They sounded as though they were in the aircraft with me. I couldn't get away with anything. To add to our embarrassment, we couldn't find the NCLT, swimming pool, or bowling alley, and one of us even missed his 0400-0800 mail buoy watch. We did get all the other JOs' boots polished in our squadron, and some of the guys even let us have their IWO, Boat-O and SDO watches, so it wasn't all bad.

The transition from being an FRS student to a salty fleet aviator is a laborious and humbling experience. Nuggets reporting to their first fleet squadrons should know all their NATOPS (aircraft, CV, LSO, general). They should practice being good wingmen, and always be prepared to assume the lead. Check and double-check aircraft configuration and weight. This might save you one day. Nuggets should study as much as possible in preparation for shipboard hops. Try to learn something new during each flight. Be safe and predictable behind the boat. A solid 3.0-ball flyer with a 100 percent boarding rate is better than an idiot savant who shows occasional flashes of brilliance. Finally, learn at least two routes from your rack to the chow hall.

LCdr. Lindstrand is the Safety Officer for VA-72.

The one number always open to you is
1-800-HOT-SFTY,
the Safety Center hot line. We're ready and able
to answer your safety questions, whenever they
come up. Try us, can't hurt.

We've Lost The Ship

By Lt. Gary T. Cooper

WE launched on a mid-morning surveillance hop in the North Atlantic. The weather was typical for that area: 1,500-2,000 feet overcast, with three to four miles visibility, and cold. The water temperature was 30 to 40 degrees, not exactly great for swimming.

I was the Airborne Tactical Officer (ATO), and the aircraft commander was another "jaygee" with a cruise to the Persian Gulf. Our aircrewman was a AW2 on his third cruise. We had flown several missions together and had established ourselves as a tight, aggressive crew.

We launched and climbed to 500 feet, then headed east. The weather gradually improved as we leveled off at 1,500 feet. Ten miles from homeplate, our ESM showed something just off our nose. The sensor operator confirmed a medium-sized contact slowly moving south. We soon saw a Soviet AGI five miles away.

After reporting the contact, we dropped down to 500 feet and went through our rigging procedures and photo run. We spent 20 minutes with the AGI, then climbed back to 1,500 feet and flew east for 35 miles. The rest of the flight was routine until we started our recovery leg home.

As we completed our run through the southern sector, we checked our fuel and felt we were burning a little more than what we

predicted. We turned inbound from the southwest. The weather had improved dramatically to 7,000 feet, scattered, and 15 miles – rare for the North Atlantic. But on our inbound leg, the ceiling began deteriorating to 1,500 feet.

We leveled off at 150 feet to stay out of the clouds. The visibility was dropping to one mile and light haze. Ten miles from the ship we were down to 550 pounds of fuel, not exactly what we wanted, but enough to get us safely aboard. At two miles, we hit fog. To make matters worse, our aircraft was down for night and IFR flight because of a stabilization problem.

We made a 180 to stay VFR, but the weather behind us was rapidly closing in. We were VFR in an area two miles wide with a 200-foot ceiling. We called the ship to ask them to steam toward our position while we tried to remain VFR. We launched a smoke marker to help them out. As we flew our holding pattern, we continually transmitted our position. Our smokes were drifting into the fog bank. The weather was getting worse.

Finally the HAC ordered another smoke as he entered a manual doppler hover to allow the ship to find us while we stayed where we were. Everything seemed to be OK; we could see the smoke and enough horizon to feel comfortable. We had 400 pounds of fuel

remaining.

The ship was 1.5 miles away, and we felt we had it made. Then I lost the smoke as we went completely IMC at 50 feet. We lost the doppler return. The HAC called for an instrument takeoff from a hover. We went back on instruments and leveled off at 500 feet. We began a gradual descent to 50 feet at 50 KIAS. We asked the ship to drop smokes from the flight deck for an emergency visibility approach.

As I transmitted on the radios, I broke my instrument scan and looked out my right window to try and see how the visibility was. I saw the water; the weather seemed to be improving. As I returned forward, all I could see was water. A quick check of the attitude gyro confirmed we were 15 degrees nose down in a 20-degree bank.

"Altitude! Back stick now! Now!" I called and pulled slightly aft on the cyclic. The HAC pulled military power and aft cyclic. We blasted out of there and once again leveled off at 200 feet.

At this point, the OINC got on the radio. He was normally a flamboyant person with a special talent for volatility in pressure situations. We expected him to chew our butts – just what we needed. But his tone was calm, almost fatherly. He told us to keep flying and work it out. He went through a series of procedures to help us conserve

At this point, we began to think about ditching. The crewman was set up in the back with all the rafts in place with all the smokes. We also thought about the weather. All we had were wet suits.

fuel, including reducing our Nr from 106 percent to 102 percent, keeping the doors closed, and getting rid of our sonobuoys.

As the OINC gave us a little pep talk, our radios began breaking up. The situation was rapidly deteriorating. I was getting more excited and called the ship to repeat their transmissions, which they did many times. Through the static we heard, "Turn left 090 . . ." We had no idea what was happening, whether the ship was turning or where we were going. But we were out of options and turned left.

At this point, we began to think about ditching. The crewman was set up in the back with all the rafts in place with all the smokes. We also thought about the weather. All we had were wet suits. We predicted 10 minutes in the water



before we lost our mobility, and 30 minutes before we lost consciousness. There was one more thing: Our squadron had just lost an aircraft and a pilot the previous week.

We rolled out on our heading as I tried to call the ship. I looked out to my left and saw something that was whiter than the surrounding clouds. Soon I could make out something gray and realized it was the ship. We turned and made an uneventful port-to-starboard recovery. As we crossed the flight deck, I distinctly remember not being able to see the ship's bow from the flight deck. Our estimated distance from the ship when I first saw the wake was less than 100 feet.

We shut down and the flight deck crew, HCO and OINC greeted us. We were obviously not the only ones under stress. We could not say anything. We did not want any attention. We locked ourselves in the det office and thought about what we had gone through.

Our ship's captain was ex-

tremely safety conscious and demanded that nothing happen without his consent. The OOD had realized our situation and the possible consequences. He had taken charge and immediately set the sea-and-anchor detail, then turned the ship toward us. Then he notified the captain. His response and quick thinking, as well as his courage, gave us the extra time we needed to recover.

Our OINC kept his cool which helped us keep ours. He provided the right touch at the right time. My HAC and I had also developed our coordination, and that helped us. We knew the aircraft and, above all, we respected each other. If either one of us had tried to do it all, we would not have made it.

Our aircrewman knew his job and played a key support role. He didn't clog the ICS, or get excited. He backed us up on the radar, made the necessary calls, and stayed ahead of us. He began the ditching checklist well before we told him but kept it to himself so as not to distract us.

Lt. Cooper is an SH-60 pilot with HSL-47.

Those To Whom I Give Thanks

(On a Black Night)

By LCdr. Timothy B. Lewis

10



At 30 feet the aural and visual warning signals filled the cockpit. We felt the Gs. Twenty feet. The aircraft was now responding to my control inputs, and we bottomed out at 15 feet in a shaky hover.

IT was one of those days when all O-4s should be home watching TV, and the hard-charging JOs should be in the cockpit building time. That night, however, I was chosen because of my experience to teach four lieutenants the fine art of ship landing qualifications (SLQs).

The day before, I peeked at the flight schedule and saw that I was the instructor for one of our infrequent, night, shipboard hops. I told the Ops Officer that I wasn't current, but he told me not to worry: The CO had given me a waiver because of my experience. Now, Ops Officers are crafty folks, and knowing that ail of us need to have the ol' ego stroked, he was stroking mine. If the Skipper had confidence in me, I could do this mission and, for that matter, any mission. Yeah, I had thousands of hours under my belt. I had pulled a few flights out of harm's way. I was the man for the job.

I strutted out of Ops and went straight for the briefing room to see what ship I was going to. It was my worst nightmare, an LST. I looked at the flight schedule and saw that there would not be a moon that night, either. To me, a night approach to an LST is the most demanding – and most terrifying – type of shipboard landing we helo jocks make. There is no glide slope, an approach path 90 degrees to the ship's heading, no DME and no air boss to help me stay out of the water. On top of all that, I began

wondering when I last saw an LST at night.

I walked back to Ops and paged through my logbook. Hmm-m, not last year, nor the year before. I grabbed my older logbook, and back toward the beginning, before all of tomorrow night's copilots were even in the Navy, was the lone entry. Five years ago.

The next day I assembled my crew and briefed for the evening's flight. I saw young, eager faces, full of anticipation in meeting a new challenge. But behind those faces, I sensed an innocence, a feeling of immortality that is inbred in all of us. Without this confidence, most of us would not be pilots.

As we get older, we become more aware of the dangers of our profession. I am sorry to say that I have had many close friends with whom I cannot share another beer, tell the stories of how "it used to be," or debate how Z-Grams changed the Navy for better or worse. They fell victim to a moment's inattention. It is this reality that I wanted to impress on my copilots that night, but I realized that these things can't be taught; they must be learned through experience.

I would be in the left seat while my first copilot would watch a few day landings as I updated my currency. Then he would qualify SLQ/day and then disembark on the ship. The next copilot would get in and repeat the process. As we flew into the night, the horizon disappeared, and we all became more alert.

For those of you unfamiliar with approaches to an LST at night, here's a quick lesson. The approach is 90 degrees to the ship's heading. Since the ship is required to maneuver to put the wind in our flight envelope, this usually puts the ship with winds on either the port or starboard

side. Now, there is a little correlation with wave direction and wind direction, which results in the ship riding in the trough of the swells, instead of into the waves. The bottom line is that the ship usually rolls more than we are comfortable with.

During the day, there's not much of a problem because we have the horizon as a reference. But as the horizon disappears, all we have left for a visual reference is the rectangular pattern of the landing area. When the ship rolls, this lighted landing area appears to change shape. From a stabilized position of 300 feet and one mile to either side, the helo pilots have one of two impressions: the ship is rolling and pitching (the correct perspective) or that the ship is stable and the aircraft is alternating between very-high-on-glide-slope to very-low (a dangerous perspective). It is hard to tell the difference without good crew coordination.

As I completed my last crew swap, I felt good. The copilots were doing well, and their landings were safe. My last copilot had a lot of time in the H-3 and was nearing his HAC check. He was confident and a good stick. His first two night landings were a little rough but within parameters. I told him to find a comfortable glide slope on final by picking a spot on the windscreen and aligning it with the landing areas. If he kept his line-of-sight along that spot and the deck, he would arrive safely over the deck. As we lifted off the deck to head downwind, we immediately went into the black night.

I glued my eyes on the radar altimeter as briefed and reported, "Positive rate of climb. Gauges good."

"Roger," he replied. He was doing well and he sounded confident. "Turning downwind, heading 245."

"Clear right," I said. "Fifty feet prior to level-off." What crew coordination.

At the 180 we called, "Tower, 725, 180, gear down, right seat."

"Roger, 725," the tower responded, "winds 325 at 5, pitch 3, roll 5. Cleared to land."

"Power's up, gear rechecked," I said as we rolled onto final, "250 feet, 70 knots . . . lookin' good."

I found my own spot on the windscreen to check the glide slope and everything looked fine. I called, "Passing through 150, a little slow, but OK. Deck's in sight." I returned my scan to the spot on the windscreen.

Then, out of the corner of my eye, I noticed a gauge

moving rapidly. The RAD ALT! It was falling! What's wrong. He's right on glide slope and everything looks great.

I instinctively did what years of instructing had ingrained: I believed the gauges and began to reach for the controls to stop the rapidly-increasing descent rate.

"I've got it!" I screamed. It was a race between my reflexes and the unwinding altimeter. Sixty feet, 50 feet, 40 feet. The attitude gyro now indicated a high-nose position and I pushed the stick to the horizon. Simultaneously, I pulled power. The strain of the additional torque made the aircraft shudder and the rpm drooped in response to the additional lift required. At 30 feet, the aural and visual warning signals filled the cockpit. We felt the Gs. Twenty feet. The aircraft was now responding to my control inputs and we bottomed out at 15 feet in a shaky hover. At this altitude, the deck had disappeared. I climbed to a safe altitude.

I didn't want to frighten my crew so I said, "You were a little low. We are now back on glide slope. Want to take the controls and continue the landing?"

It was a futile attempt to be cool. We all knew that we had been milliseconds from a mishap and everyone was visibly shaken. We landed on the LST and decided to call it our last landing. We loaded the rest of our crew and headed home with a quiet cockpit.

During the debrief, we tried to find the cause of our near-mishap. My copilot and I both felt there was nothing wrong with his approach. It was not my logical thought processes that kept us out of the water but all my past instructors yelling in my brain. *Believe your gauges.*

The primary fault lies within crew coordination and my instructional methods. I had not thought to tell my copilot that the windscreen-spot-alignment method is not fool-proof. If you descend below the glide slope, you can get the proper picture by two ways. First, is by simply raising the collective and keeping the attitude the same, which is the correct way. The second method is to raise the aircraft's nose and freeze the collective – the improper way. If you use the improper method, the high rate of descent continues and the sight picture looks good. As the aircraft falls further below the glide path, you need to keep raising the nose to correct problems. This begins a vicious circle which ends with the aircraft nose high, going down quickly. ◀

LCdr. Lewis is currently assigned to HC-1 as the COMNAVAIRPAC SAR Evaluator. He has over 3,300 hours, including 2,400 hours in the H-3. During the past 18 years, he has saved over 27 lives during SAR missions.

When life hands you lemons, make lemonade.

American proverb

Is Your Pre-mishap Plan Working?

By LCdr. F.M. Benkert

So, you exercised your Aviation Mishap Plan. You even went so far as to call the Naval Safety Center to verify the crash line (AV 564-2929). All the paperwork flowed freely. Great! Did you stop to consider just how hard it is to recover a wreck in a swamp, or on a mountain, or inaccessible terrain?

A jet recently crashed in a swamp about 60 miles from its home base during the winter. It took 33 days to return the parts to the air station to begin the investigation. The crash site was only five miles from the center of the bombing range. However, it was 14 miles via unimproved roads that required four-wheel-drive vehicles. The trip from the range tower to the end of the road took almost an hour. From there, it was a 40-minute hike or swim in the swamp. Given the conditions, it was fortunate that no one was injured during the daily trek. You can bet it wasn't fun for the mishap board or the squadron members who worked to recover the jet.

In this instance, there seemed to be a couple of problems. The premishap plans were weak, and the local NAS couldn't provide the support requested by the mishap board. This problem is not just associated with this particular NAS but has been seen at other



Navy and Marine Corps bases.

The solution is in the planning. If you are a tenant command, review your local operating areas and meet with base personnel to determine their capabilities. The supporting station should, in turn, analyze its abilities for the specific area. Who provides transportation? What types of vehicles are needed? How about heavy equipment for recovering the wreckage? Does someone hold a historical file of past mishaps and problems encountered? Are you ready for the big one at the local mall?

Appoint an officer or other person from the station whose primary duties are to assist the AMB. This officer reports directly to the CO and XO and has access to on-base equipment or to contract for the required heavy equipment to complete the recovery. The officer works directly for the senior member of the board until the recovery is complete.

You should have a plan of action that spells out under what

conditions you'll contract for recovery equipment — trucks, cranes, swamp buggies, front loaders. Contractors should be notified in advance about the requirements for responding to a mishap.

Transportation plans should include logistical support — meals, heads, water and medical — for the recovery crew and any security force that's needed. Equipment should be provided to allow communications from the site to the nearest facility.

Points of contact with the local authorities should be made in advance for the most frequently used areas. Local police phone numbers, as well as the numbers for the Environmental Protection Agency, the forestry service and other concerned agencies should be included.

A well-conceived premishap plan involves determining what assets are needed and where they can be found. Don't end your planning with the initial mishap message report. ◀

LCdr. Benkert is a CH-46 Pilot. He is currently assigned as a mishap investigator with the Naval Safety Center.

13

ANYMOUSE

Snowball Fight Hazard

After a late December snow, a snowball fight developed on the outer fringes of the flight line. No big deal, until two turning helicopters entered the picture. Simultaneously, the snowball fight moved onto the flight line. While no snowballs were intentionally aimed at the aircraft, several were launched in the general vicinity of the helicopters.

I shudder to think what might have happened if one — perhaps packed tight into an iceball, or with a piece of accidental FOD — had hit a rotor blade or any other vital area of the aircraft, especially the crew chief looking out the open aircraft window.

Fun is fun, but not on an active flight line.

I.M.A. Frostmouse

Propwash Hazard

While I was working on the rotorhead of a CH-53E, I saw an E-2 from the local VAW squadron taxiing toward me. I didn't think anything of it and returned to my work. As the Hawkeye came abeam of my position, it made a sharp turn away from me to park. During the turn, its propwash hit my aircraft, causing the upper cowling of the M/G/B oil-cooler blower to fly open. The lower half was already open and in use as a work platform. Unfortunately, an open toolbox on top of the upper half was thrown off the cowling, striking the No.2 engine's open-work platform. The box dropped down the opposite side of the helicopter and hit the ground close to another maintenance person.

The toolbox weighed approximately 65 pounds, and tools were scattered all over the aircraft and ramp. The main rotor-head fairing ("beanie"), which had been removed for maintenance and was resting near the No. 3 engine, was thrown from the aircraft, cracking the plexiglas access cover. Either

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item could have easily killed someone.

We were lucky this time. Just because you're ashore, don't forget about the hazards of working around aircraft.

Windblownmouse

Is a Signal Flare Dangerous?

We have a problem in handling the Mk-25 and Mk-58 signal flares. Personnel keep bringing them into buildings and hangars.

I saw an aircrewman in front of maintenance control who had a Mk-25 in one hand and was lighting a cigarette with the other.

Our det sometimes uses helicopters to store these flares both ashore and afloat. Six Mk-25s and two Mk-58s were taken off a helo and found two days later in an old tin storage shed lying in a puddle of water. Flares taken from another helo were found later in the day in the grass.

We need training on the safe way to handle these flares. People who mishandle them should be reprimanded. My supervisor is working on the problem, but these bad practices still occur. No one here seems to think a signal flare is dangerous.

Incendiarymouse

Rules Is Rules

The pilot of an S-3B cleared the aircraft for flight even after a lineman told him that both anticollision lights didn't work. The pilot did not call any trouble-shooters to correct the problem. OPNAVINST 5442.4K clearly said that this aircraft was down.

This day flight was a first-time hop in the S-3B for a new skipper (COTAC seat). I think the junior officer pilot was reluctant to down the aircraft because of his copilot.

The bottom line is: Don't fly downed aircraft!

Downfensuremouse

Making the Right Decision

Two fighters returning from a low-level have a birdstrike. Act of God — happens all the time. They landed at the nearest suitable airstrip. The pilots discuss their situation and whether they should return to their home field. What's the problem? They were sitting in the hot pits in separate aircraft, discussing the matter over squadron frequency?

The lead was the junior aviator with minimal hours in the aircraft. After a lot of talk, the wingman, the senior aviator, asked if the damage affected the aircraft. The lead replied that the plane seemed OK.

A detachment of this type of aircraft was aboard this remote station. Someone from the det should have been summoned to inspect the damaged aircraft. There was an element of get-home-itis in this story as well. They flew home.

Have you ever been in a situation when you thought the direction you were headed was wrong? I have! I know that I have put myself, or allowed myself to be put, in similar circumstances. Recently, an aircrew coordination instructor suggested that when we are in a situation that exceeds our capabilities or is wrong, we should stop and say, "This is stupid!"

Birdstrikemouse

Pinned!

By Lt. C.E. Sandford



THE ready room suddenly grew dark as black clouds rolled in to block the afternoon sunshine. I had become accustomed to the summer rain-showers. I knew our flight might be delayed. It was going to be my last four-plane formation flight in the T-2 before FCLPs. I was anxious to complete the formation stage, and even more anxious to begin the weekend.

Just when it looked like the flight would be cancelled, the sun popped out and the clouds began breaking up. The Ops Officer launched the four-plane – three student solos, and two instructors in the chase plane. We quickly reviewed all our brief items and the weather and manned up. Everything was fine until my T-2's No. 2 engine wouldn't start. The instructors told me there was no time for trouble-shooting and to take the spare.

I quickly preflighted the spare aircraft while the plane captain brought the book out. I soon had both engines on line and was preparing to taxi when the instructors called, "Hurry up, or we'll have to leave you behind." The other aircraft were in the marshal area. I was not about to be left behind. I signaled the plane captain that I was ready to taxi.

Takeoff went fine, and as we joined up and flew to the operating area, I felt confident. As soon as the instructors were satisfied with our performances, they took us into the break, and we all landed on the first

pass. I taxied into the line area and reached for the pins to safe my seat. But the pins were not there. I decided I must have dropped them on the floorboard in my haste to catch up with the other three aircraft.

As I pulled into the chocks, I saw a red flag to my left. I reached down to retrieve it only to find it was caught on something. Only then, I realized that the flag was attached to my seat, to the end of a pin! I reached behind my head to find the upper handle pinned as well. I shut the engines down as my heart dropped into my steel-toed boots. I had flown for 90 minutes with a safed ejection seat!

How could the plane captain, or the other pilots, not have noticed this drastic omission? I was too badly shaken and embarrassed to mention it during the debrief, which was mercifully short. Soon everyone was off to the club, except me. I drove home and wondered how I could have done something so stupid.

Follow all NATOPS procedures and checklists. When your habit pattern is broken – perhaps by a radio transmission during a high-pressure sequence – you are in danger of setting yourself up for a mishap. Don't let increased operational tempo or outside pressures make you cut corners.

When I get in a hurry and things are not going as planned in the cockpit, I always remember my "pinned" flight.

Lt. Sandford is an E-2C pilot with VAW-123.

15

Landing Checklist:

Don't Say It Again,

YOU'VE often heard of gear-up landings resulting from pilot error. How often have you thought "It will never happen to me because I always do my landing checklist"? About one year ago, I overlooked an item on my landing checklist. I was fortunate it wasn't my gear, but it is a good illustration of how it could happen to anyone.

My squadron left for our first set of work-ups in preparation for deployment to the Med. I was a nugget in a Corsair squadron and had less than 30 traps. As a result of an extensive FCLP syllabus and an outstanding training program from our LSOs, I felt pretty confident about going to the boat – two weeks later!

16 Well, we ran out of time and waited until we had made our transit to the Caribbean to CQ the rest of the air wing. Now we were 80 nautical miles south of Guantanamo Bay, and the weather was clear and 7. What more could you ask for on a night CQ? How about the moon? After a day touch-and-go, and a trap to satisfy night requirements, we briefed the night CQ. It was a cold start for a pinky launch, and push time was about 30 minutes after sunset.

"Decoy 406 commencing, state 5.0," I called. By this time the old adrenal gland was working 100 percent. Day became night in the five-minute trip to three miles astern. As I looked around for the comfort of the "night sun" that shone brightly two weeks earlier, I soon realized that these would be "real" night traps. Who needs the moon anyway! My first touch-and-go was an OK pass, but things went downhill from there. It was my night in the bag. After several power calls, technique wave-offs and fouled deck wave-offs, and a trip to the tanker, Air Ops decided that nine looks at the deck was enough for me.

"Decoy 406, hook up, clean up, your signal is divert, heading 350, 83 miles, check in button 14." I cleaned up the aircraft and turned north, accelerating to 330 knots to begin my bingo profile. I had twice the bingo fuel required and began to prepare for a normal landing roll out on an 8,000 foot runway – in Cuba! Not able to talk to approach, I dialed up Leeward Tower and advised them I was on a bingo profile into Guantanamo. Radar was shut

down for the night, so I was limited to a VFR approach. Tower briefed me on the duty runway and said that it was a right downwind entry to runway 10. They also told me not to fly west of the approach end of 10, as this was the Cuban border.

I was getting busy at this point. With 30 miles to go, I broke the shear wire on the anti-skid brake switch cover, and turned the anti-skid on, planning on a normal night rollout. I could see the beacon at the field at this point, and double-checked my TACAN which was pointing right at it. As I got closer I turned slightly east to prepare for the downwind entry. At 1,000 feet with about four miles to go, I was reaching for the gear handle when the tanker gave me a call.

"Decoy 406, Blaster 520."

"Decoy 406," I replied, "Go ahead, Blaster."

"Decoy 406, Charlie Oscar passes to take an arrested landing."

"406 Roger."



Do It Again!

By Lt. Mark Benson

I verified the arresting gear position on the field and continued with my landing checklist, making sure my anti-skid was off for the arrested landing. I was now approaching the abeam position, strategically planning my turn to stay inside the flashing beacon which was the most obvious light on the airfield.

Having finished my landing checklist and checking it twice, I was ready to turn off the abeam. As I rolled out of the 35-degree angle-of-bank turn with a centered ball, the green chevron clicked to a yellow donut. I pulled power just before touchdown to land a little slow. This reduction of energy makes a big difference in rollout distance, which can be uncomfortably long in the A-7.

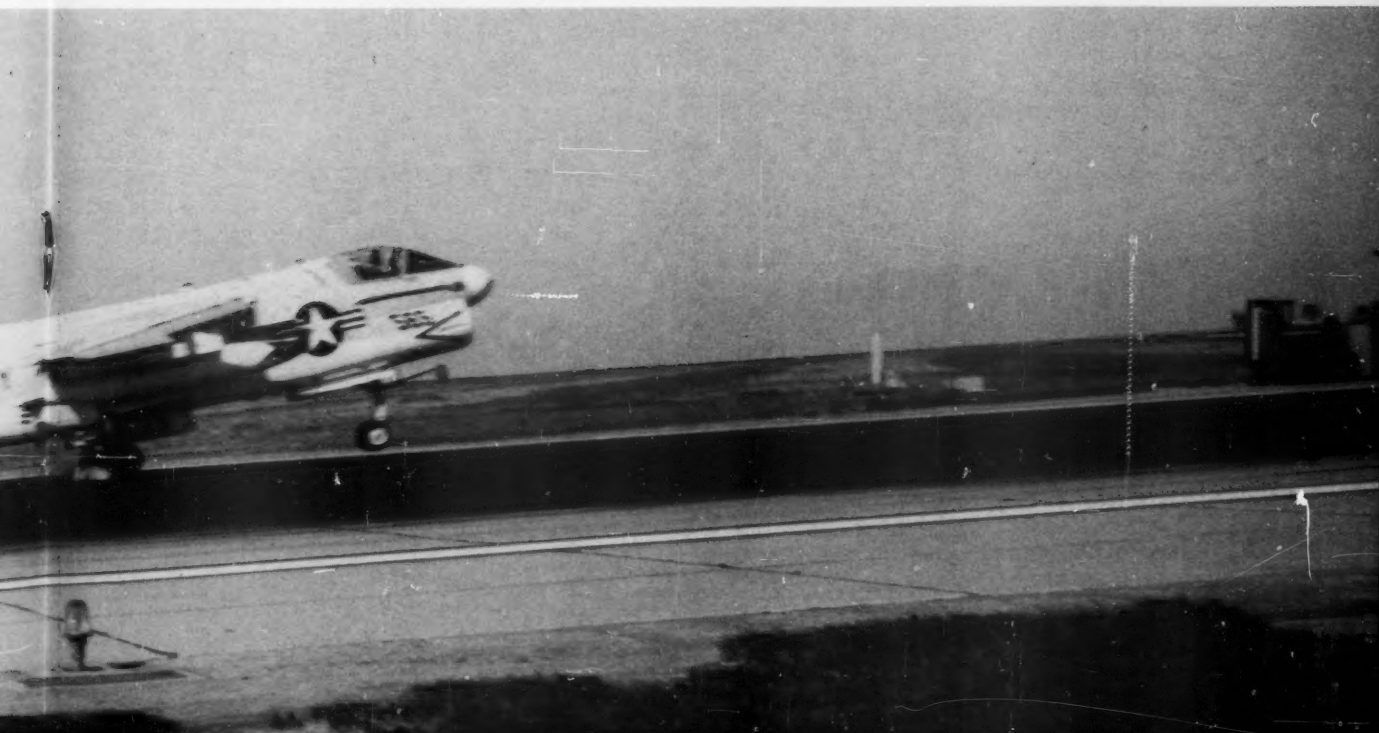
As I rolled over the gear 1,000 feet after touchdown, I prepared for the sudden deceleration. It never came! I felt like a speeding bullet and jumped on the brakes. I was going 125 knots and still had 7,000 feet of runway. I knew right away what would happen, and before I released the brakes, it did. Luckily, only one tire blew. I

performed the immediate-action items and stopped just before the 3-board, a record short rollout distance for *this* guy.

I soon realized why I had bolted. I didn't bolter; *my hook was still up*. I had checked my landing checklist twice, but I still missed it. "Gear-down, flaps down, hook-down (or up?). Harness-locked, Anti-skid-off." You can say it so fast. I was so busy I don't remember if I actually saw three-down-and-locked indications. Now I could look forward to a four-hour escapade getting the aircraft off the runway, instead of drinking a cold one at the club. Another learning experience for the next article my XO makes me write! If I'd taken the time to touch each item on my landing checklist, I probably would have been able to enjoy that drink.

Remember those old training command rules when things aren't going quite right. When doing your landing checklist, don't just say it again; do it again. Touch each item like you are actually doing it. Don't *you* get caught.

Lt. Benson currently serves as Comm/Nav Officer in VA-72.



What You Don't See Can Kill You

By Cdr. Robert Bason, MSC

CO is colorless, odorless and tasteless. It is classified as a chemical asphyxiant whose toxic action is a direct cause of hypoxia.

CARBON monoxide (CO) is perhaps the oldest gaseous poison. More deaths are attributed to it than any other toxic gas. The potentially toxic effects of CO were recently demonstrated during a training flight.

Approximately 15 minutes after takeoff, at 37,000 feet (cabin altitude was 13,000 feet), the T-2 instructor pilot (IP) began feeling minor symptoms of hypoxia. Several minutes later, his student reported similar problems. A few minutes later, the IP's condition worsened and he diverted to a nearby airfield where he made an uneventful landing.

The flight surgeon's examination revealed symptoms of CO poisoning. Blood tests confirmed the diagnosis. The IP had a carboxyhemoglobin (the amount of CO in the blood) level of 16 percent about 90 to 120 minutes after he felt the first symptoms. The student's level was 7 percent. The IP smoked occasionally; the student did not. (A nonsmoker's CO blood level is normally less than 1 percent. A one-pack-a-day smoker's level is 4 percent to 5 percent, and a two-packs-a-day smoker's level is 8 percent to 9 percent.)

Both pilots said they wore their oxygen masks from takeoff to landing — with one exception. The IP had momentarily removed his mask just before landing because he was nauseous. Postflight inspection did not reveal the source of the CO, and a sniff test of the LOX converter proved negative. Unfortunately, the LOX bottle and the aircraft LOX system were purged before a chemical analysis could be done. The LOX facility that serviced the aircraft indicated that the servicing equipment was good and there had not been reports of any problems with the LOX used.

CO is colorless, odorless and tasteless. It is a non-irritating gas produced by the incomplete combustion of fuels such as coal, wood, gas, oil and gasoline. In concentrations above 70 percent, CO does have a garlic-like odor. It is classified as a chemical asphyxiant whose toxic action is a direct cause of hypoxia.

CO is absorbed only through the lungs where it enters the bloodstream in the same manner as oxygen. CO

combines reversibly with hemoglobin molecules with a strength 210 to 240 times greater than oxygen. The compound that is formed, carboxyhemoglobin (COHb), cannot carry oxygen. COHb also interferes with the release of oxygen by the blood. These two effects result in hypoxia and less oxygen being liberated to the tissues.

Man's first encounter with CO didn't come from the incomplete combustion of carbon materials. He has always been exposed to CO produced from the normal breakdown of hemoglobin. The presence of small quantities of CO in the blood results in a COHb level of 0.4 percent to 0.7 percent, and is considered neither beneficial nor harmful.

The reaction to different blood levels of COHb varies considerably. Some people may become comatose with a COHb level of 38 percent, while others may remain clear-headed with levels as high as 55 percent. COHb levels over 60 percent are usually fatal. Forty percent usually makes people collapse and lose their skin color. Between 15 percent and 25 percent, a person may suffer from headaches, nausea, vomiting, weakness, dizziness and dimness of vision. Below 15 percent, at sea levels, symptoms rarely appear. The faster the metabolic rate, the sooner the symptoms appear.

Canaries are kept in mines to warn against CO because the birds' accelerated metabolic rates make them succumb to poisoning much more quickly than humans. CO's toxic effects are exaggerated at high altitude, where the partial pressure of oxygen is reduced. This characteristic could make lower levels of CO a significant cause of some aviation mishaps.

CO poisoning should be treated by removing the person promptly from the CO atmosphere and giving him high concentrations of oxygen. It takes about 250 minutes to drop the blood level of COHb to half of its original value through normal breathing. Breathing pure oxygen reduces the time to 40 to 50 minutes.

What can you do if you suspect that your aircraft's LOX system is contaminated with CO? That's right! Activate your emergency oxygen system.

Cdr. Bason is head of the Naval Safety Center's Physiology Branch.



Left to right: Lt. Randy Duhrkopf, LCdr. George Starnes

LCdr. George Starnes
Lt. Randy Duhrkopf
VA-115

LCdr. Starnes (pilot) and Lt. Duhrkopf (BN) launched from USS *Midway* (CV-41) on a post-maintenance checkflight. After completing their tests, the crew proceeded to RP/D-22 (Scarborough Shoals) to make several practice bombing runs. As they left the target area, they spotted a small boat that had capsized. There were four people standing on the overturned hull.

The A-6 crew marked the boat's location and returned for a closer look to check for additional survivors. Because of the high seas, they could not find the boat but relayed the information to *Midway*. An H-3 was vectored to the area, and the A-6 returned to the ship.

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LCdr. Jerry Kauphusman
Lt. Scott Stroble
AW2 Frank Gonzalez
AWAN Mike Devito
HS-12

Left to right: Lt. Scott Stroble, AW2 Frank Gonzales, AWAN Mike Devito, LCdr. Jerry Kauphusman



BRAVO ZULU

A Sea King from HS-12 searched for the boat and survivors until darkness postponed the effort. The SAR resumed the following morning, and after 30 minutes, the H-3 found the boat with *six* fishermen. AWAN Devito (swimmer) jumped from the hovering helicopter to assist the exhausted survivors. The six men were hoisted on board the H-3 and transported to USS *Ragley* (FF-1069) for medical examination.



Left to right: Ens. Gregory Conway and Ens. Eric Hendrickson

Ens. Gregory Conway
Ens. Eric Hendrickson
VT-31

Ens. Conway and Ens. Hendrickson were on an airways navigation solo-training flight from NAS Corpus Christi to Davis-Monthan AFB. Two hours into the flight, at FL 220, the two Student Naval Aviators (SNAs) saw a flashing master caution light and a steady left-engine chip light.

They checked for possible secondary indications but didn't see any. They secured their T-44's left engine in accordance with NATOPS using the emergency shutdown checklist and declared an emergency with Houston Center. They asked for an immediate descent to Fort Stockton-Pecos County Airport. During the descent, the two SNAs completed the dead-engine checklist and discussed their options. They completed the

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first 12 items of the starter-assisted airstart checklist as a precaution.

At two miles for a straight-in approach, they lowered the gear and flaps and completed the landing checklist. After touchdown, the two ensigns placed the right condition lever in low idle to help slow their aircraft, and lightly applied the brakes until the T-44 came to a stop.

Their CO endorsed the two students' actions and knowledge of NATOPS, saying, in part, "training exists for a very real and important purpose: to enable (students) to handle actual emergencies. The 'It-can-happen-to-you' syndrome is illustrated throughout this entire scenario and shows the importance of knowing NATOPS cold."

**1stLt. Mark W. Dahl, USMCR
VMFA-122**

1stLt. Dahl launched from EAF Twentynine Palms as Dash 2 on a low-altitude, low-angle, dive-bomb delivery sortie. During the dive recovery, following his last ordnance drop, his F/A-18 rolled suddenly to the right. He countered the roll, began climbing, and called for his flight leader to join and look over his aircraft.

While climbing, 1stLt. Dahl saw that his aircraft's right, inboard leading-edge flap had broken off. A large section of the right vertical stabilator was also missing. The lead joined and confirmed the damage. 1stLt. Dahl selected flight control systems (FCS) on his data display, but could not see any abnormalities. However, a roll limit and G limit caution were indicated.

After making a controllability check, 1stLt. Dahl determined that a 170-KIAS, half-flap approach would be best. He descended toward Twentynine Palms and flew a long, straight-in approach to a short-field arrestment. The cause of the flap failure is under investigation.





Left to right: Maj. William J. Davlin, Sgt. Herb Jones, Cpl. Troy Mikko. Missing from photograph are Capt. Walter T. Ellingson and Sgt. Dan Brochu.

Maj. William J. Davlin, USMC
 Capt. Walter T. Ellingson, USMC
 Sgt. Herb Jones, USMC
 Sgt. Dan Brochu, USMC
 Cpl. Troy Mikko, USMC
 MAG-46, Det A

While flying on an IFR flight plan in instrument conditions, Maj. Davlin (HAC) and Capt. Ellingson (copilot) detected fumes and smoke in the cockpit of their CH-46E SR&M. They immediately scanned their instruments to find the problem. As the smoke and fumes increased, the two aviators reviewed their NATOPS procedures. The utility pressure began fluctuating, then dropped to zero.

Sgt. Jones (Crew Chief), Sgt. Brochu (QA Tech), and Cpl. Mikko (Avionics Tech) determined that the utility hydraulic pump was leaking badly and had begun turning white from heat, causing an in-flight fire. Maj. Davlin continued flying the aircraft and called ATC to declare an emergency. He set up for an immediate landing at the nearest instrument-approach-capable airfield. As the men in the cabin extinguished the fire, Capt. Ellingson made backup instrument and procedural calls to Maj. Davlin. After 20 minutes, the helicopter broke out of IMC at 400 feet on final. Maj. Davlin made a normal landing.

Postflight inspection revealed that a utility hydraulic pump had failed and was completely destroyed in the fire. ◀

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Occasionally, we get inquiries as to the derivation of the Bravo Zulu feature, as well as the meaning of the term "Bravo Zulu." Bravo Zulu, the precise meaning of which is "Well Done," was apparently first used during World War II, perhaps by Admiral William "Bull" Halsey himself, although the exact date and circumstances are lost. BZ is a category of the signalman's terminology called a "governing group," and is used to set off a group of data or messages which follow the BZ.

Every service safety magazine has its own laudatory feature, and Approach used a succession of titles before settling on Bravo Zulu. The first was "Old Pro," followed by "Good Show" (the British use a similar title), then "Well Done." The first Bravo Zulu appeared in the February 1972 issue of Approach and has become a regular feature of the magazine ever since.

If you want to submit a BZ nomination, here's how.

The nomination must be submitted through the commanding officer of the squadron, chopped through the appropriate air wing, MAG or PATWING. A 5-by-7 black and white photo of the aircrew involved should also accompany the story and endorsements. Photos of the event are always welcome, such as a barricade arrestment or landing approach. Views of damaged equipment, i.e., canopies, tires, are also important.

Send the nomination to: Editor, Approach Magazine, Naval Safety Center, NAS Norfolk, VA 23511-5796.

The Shadow Knows, or How Do You Like Us So Far?

By Lt. Ward Carroll

AIRSHOW. The last of the good deals – rental cars, hotels, adoring fans, the full rock star treatment. But, just like in the world of rock and roll, today's superstars are one bad move away from infamy.

The fleet-experienced pilot rushed back into town from "alternate tasking" the night before the flight to the airshow. He also mentioned to his nugget RIO during the brief that he had to leave town again Sunday evening, so they were going to have to return as soon as the show ended on Sunday.

As they pulled into the chocks at the airshow field, they were greeted by the Air National Guard plane captains. The RIO told them he and his pilot wanted to leave as soon as possible on Sunday. The plane captains replied that wouldn't be a problem. The rest of the beautiful midwestern day was spent telling Boy Scouts why Navy Air was the way to go, in spite of the fact that Air Force planes were much cleaner.

Later that afternoon, the crew headed for the hotel to unwind at poolside and maybe sign a few autographs. The pilot mentioned several times the need to return to homeplate in time for him to catch his commercial flight out of town.

"This week coming up is going to be real busy for me," he commented.

The next morning the RIO received a call from Air Guard Ops saying they could leave at 1355 along with an Air Force F-4 if they wanted. The planners had set aside a five-minute window during the middle of the airshow. The RIO, knowing how badly the pilot wanted to pull chocks, agreed to the idea right away. He told the pilot about it, and they both checked the time. It was just after 10 a. m. They still needed to pack, get to the field, brief and file a flight plan. The pilot realized it was going to be tight.

The F-14 crew got to the field and discovered their airplane had been moved about two miles away from the static display area. Air Guard ops told the confused crew that they didn't want the jet to start up around the crowd, which made sense. Ops also said the F-4 crew had agreed to do a flyover and asked the Navy crew to do the same.

The pilot initially balked at the request. He knew fly-

overs were prohibited in his air wing. But, he also knew that the squadron crew from last year's show had done a flyover without any problem. The new RIO was anxious to have his name announced over the P.A. system as they zorched by, so he didn't offer any reasons why they shouldn't do it. The crew almost felt obligated to honor the request since Ops had gone to the trouble of offering the earlier launch time. Shrugging his shoulders, the pilot told them, "OK."

Ops had said, "You guys might want to talk with the Phantom crew before you walk and get the sequencing squared away." But the F-4 crew was nowhere to be found. The Navy crew briefed the flyover between themselves as they ate a quick lunch at the base ops gedunk. The pilot decided to do an afterburner climb-out to 2,000 feet, head out about two miles and then come by at 500 feet and perform a high-G, 180-degree turn and depart the area. The RIO had no flight-demonstration experience, but felt the pilot's plan was going to be a crowd-pleaser.

As they sat in the hold-short waiting for takeoff clearance, the pilot modified his plan slightly. He decided to do a full-blower, full-flap, 210-knot climb-out, enter a right downwind relative to the off-duty runway and hold outside the VFR initial until cleared in by the tower.

They sat in the hold-short for 15 minutes. As the pilot looked over at the capacity crowd, he felt pressured. He wanted to look good, but he knew there were FAA reps in the stands. He was also concerned with the location of the F-4. They hadn't been able to brief with the crew and hadn't seen them or their airplane all day. Were they still around?

Tower cleared the Navy jet to take off. The pilot lined the airplane up with the runway and went to military power. He wiped out the controls, staged afterburner and released the brakes. The RIO called off airspeeds during the takeoff roll and made a "flaps up" call at 170 knots during the climb to 2,000 feet. Tower cleared the Tomcat for a right base, and the pilot swept the wings aft. Unlike what they had briefed, there was no holding at the VFR initial as the tower cleared them back over the field right away.

The pilot set the airplane up with a mile-and-a-half straight-away to the show line. At a half-mile out, the RIO noticed they were only going 300 knots and looked outside to see if anything was wrong. The pilot also noticed the airplane wasn't accelerating and tapped burner to get some speed up. As they passed in front of the stands, the pilot noted 350 knots on the airspeed indicator. He reefed the jet into a left break turn.

After 45-degrees of the 4-G turn, the RIO looked down at the field and noticed the shadow of the jet travelling over the ground. As he studied the outline he was horrified to see three lines coming out from the triangular shape that the fuselage and wings formed. They hadn't raised the landing gear!

"The gear's down!" the RIO screamed over the ICS. The pilot immediately leveled the wings and raised the handle. He looked at the airspeed - 250 knots. Maybe they'd caught the oversight in time. A barber-poled right main confirmed they had not. The pilot cycled the handle back down. This time the left main was barber-poled and the transition light was on, indicating the side brace was probably not in place.

"Break out the PCL and check out the unsafe-gear-down procedures," the pilot said to his back-seater. Before the RIO referred to the book, he told tower they

wanted to depart the pattern. The tower cleared them to 10,000 feet and told them to switch to departure control.

"OK, what do you have?" the RIO asked the pilot.

"I raised the gear and had an unsafe right main. After I lowered the gear I had an unsafe left main. I've also tried blowing the gear down. The left gear is still barber-poled."

"How do the hydraulics look?" the RIO asked.

"Both look good. Both needles are holding steady."

The crew now had to decide where to go with the crippled jet. After embarrassing themselves in front of the fans at the airshow, they decided not to ask the tower at the field for a visual check. In fact, they didn't let the tower know there was anything unusual going on at all. Also, the PCL called for an arrested landing and the gear at the airshow field was out of battery. They didn't have enough gas for a dirty profile back to homeplate, so they elected to press on with their flight plan to Southeastern AFB. After switching up center, they climbed to FL290.

Eighty miles out of Southeastern, the pilot asked Center if there were any other military aircraft in the area that might be able to give them a visual inspection. The crew wanted to believe the problem was with the indicator and that the left main was actually down. Center replied there were no other military jets around. The crew passed to Center that they planned to fly by the tower at Southeastern AFB and asked that emergency vehicles be on station when they arrived.

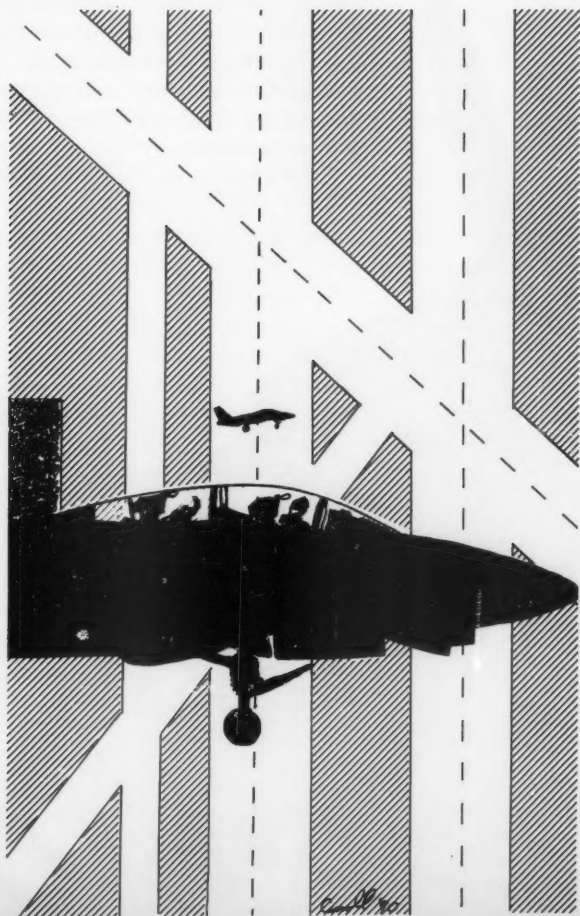
An hour after lifting off from the airshow, they flew by the tower at Southeastern for a visual inspection. The tower told the crew the left main was, in fact, up and the other two appeared to be down.

The crew had already discussed what they wanted to do in this case. They planned to do a minimum rate-of-descent landing, hold the wing off as long as possible and roll into the gear. If they skipped the gear, they'd take it around and try again.

On short final during the first approach, the pilot felt he was too high to catch the wire, so he waved off. The second time around, the aircraft successfully engaged the gear at 140 knots. The pilot kept the wings level as long as possible and managed to keep the damage below a Class Bravo mishap. Once it was clear they had trapped, they shut down the motors. The pilot and RIO safed their seats and got out as the emergency crew began foaming the aircraft.

Yeah, airshows are a lot of fun and a good way to show the public what we do. Some shows pick up the aviator's tabs for transportation, food and lodging, but even the most generous organizers won't pay for parts of an airplane damaged because of aircrew error.

Lt. Carroll is an F-14 RIO, and the editor of Approach.



Killer Cockpit FOD

Beware! It's there, lurking in your cockpit's dark recesses. Carelessly dropped, or misplaced by aircrew or maintenance personnel – and forgotten. It waits, ready to suddenly spring into action, ready to destroy. It's "killer cockpit FOD!"

The Viking taxied to the catapult. The crew made their final checks behind the JBD. Their visors were down, and they wore their oxygen masks as squadron SOP dictated. The S-3 went into tension, and the pilot ran the engines to "after fan." He rendered a snappy salute to the cat officer who then touched the deck, signaling to launch the Viking.

The solid stroke brought the menace from its hiding place on the glare shield at the base of the canopy. The black ballpoint pen hurtled toward the COTAC at 100 mph. It smashed into his mask

By LCdr. Mike Darby

and fell to the deck. The stunned crewman retrieved the now inert missile and stowed it properly. The pen's impact shattered the COTAC's mask, but he was unharmed.

FOD is hazardous to both aircraft and aircrew. If you drop something in the cockpit and can't find it, do the right thing – tell someone.

The Navy spends a lot of money on flight gear designed for crew safety. Use it. OPNAV 3710.7M

specifies that crewmen in tactical jets must use oxygen from takeoff to landing. Because of the sophisticated design of its environmental control system, the S-3B was excused from this requirement. But NATOPS says, "The oxygen mask offers desirable protection in the event of an ejection or canopy damage due to a birdstrike." We can prove the mask also provides critical protection against catapult-launched FOD flying around the cockpit.

This lucky, first-tour COTAC was on his first at-sea period. He benefitted from one of those hard-earned, written-in-blood lessons of Naval Aviation. During a recent Class A mishap, we had more bloody proof that chin straps alone won't keep helmets on during ejection. Squadron SOP changed. For us, masks are mandatory for shipboard launches and recoveries.

For more on cockpit FOD, see "FOD For Thought," Approach, October 1984. – Ed.



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I Wonder If

By Capt. Pete Taylor

WHEN I was a nugget a few centuries ago, I was blessed by having one of the best leaders a young pup could have. He trained me to become a top-notch, bullseye-smackin' attack pilot who would rather drink JP than beer. There were two other nuggets in the squadron who were airborne wizards. They backed up their verbal boasting with aerial feats — well, almost. The three of us were in constant friendly competition in everything that involved driving an aircraft.

We laid down the beer chits on bomb hops for every possible hit combination. A TACTS range couldn't have unscrambled the antics we went through in the ACM pattern, but then, come to think of it, neither could we. The first guy back in the ready room fared the best. The "greenie board," both in number of traps and amount of green displayed, was a source of great amusement as we whined about Paddles' visual acuity. Paddles would send in his seeing-eye dog rather than face us for a debrief.

The next cruise, we received a new bunch of nuggets, and guess who the training bubbas were now. The new guys were super and fit right in with the rest of us. They were soon in-

involved with our competitive exuberance and liked joining in as wingies. I won't admit to pressing the target, but at pickle time, the altimeter was definitely never above programmed release altitude. In the ACM pattern, I won't admit to busting the 500-foot bubble, but for an attack driver, minimum lateral separation is angles the opponent ain't gonna get. There was one nugget in this bunch who was a gung-ho guy. Unfortunately, his pilot skills were not as good as the rest, but he hung in there.

The three of us old pagues PCS'd from the squadron and left our trained nuggets as the new force. Within six months, the squadron lost an aircraft at a land target on a minimum-altitude bomb run. The pilot apparently flew into the ground. It was our one less-talented nugget who bought the farm. I remember thinking that maybe we had something to do with this mishap. Maybe we had taken that nugget a

little too far for his capabilities. How much peer pressure had we unconsciously put on him to be one of the in-crowd? I rationalized my concerns away.

Seventeen years later, I was visiting one of my friendly competitors who is now an airline pilot. While we quaffed a few beers and embellished our feats of aerial prowess, he suddenly got serious. Out of the blue, he brought up the same feelings I had had about that one new pilot. Independently, we had felt the same guilt.

I wonder if we had gone about our business differently. . . I wonder if we had placed a little more emphasis on training nuggets instead of competing. . . I wonder if we had recognized that this guy was slightly less talented than the rest. . . I wonder if more emphasis had been placed on our own flight discipline. . . I wonder if . . .

Capt. Taylor is the Force Safety Officer for COMNAVAIRLANT.

Egress Under Duress

By LCdr. John M. Lillard

YOU have to jump through many hoops during a turnaround: instrument schools, swim equals, bouncing and CQ, to name just a few. Buried beneath the stacks of NATOPS rules and Safety Center newsletters is a requirement to conduct training in cockpit egress.

In my squadron, as in most others, we would suit up, strap in, and leap out when the NATOPS officer started the clock and said, "Go!" We might, on a slow day, get a debrief on technique, to which we'd pay about as much attention as you would to any other non-graded drill on a Friday afternoon.

The procedure is standard despite the kind of ejection seat. You pull the parking brake, open the canopy, safe the seat and release the fittings. This mundane routine loses out to discus-

sions of more exotic emergencies, such as total hydraulic failure and asymmetric wing sweep, when it is time for a safety standdown. As a result, most aircrew members don't give it much thought. How hard can it be, anyway? Plenty hard.

In an emergency, no one is there to say, "Go!" The idea behind the training is sound, but when you know that you're about to hear the command to jump, you have a huge head start. Also, how many guys set up their cockpits during the egress drill exactly like the cockpits would be during a flight? Coming out from under kneeboards, charts and pocket checklists strapped to your speed slacks adds a new dimension. Top that off with the confusion of a real emergency, and you have what engineers call a "cascading problem."

approach/june 1990



As a nugget F-14 RIO in my first battle-group phase of workups, I had just recovered aboard the carrier. It had been an alert launch that had turned into a three-hour-plus. I was tired, hungry and feeling the discomfort that results from spending four hours in an aircraft that has no relief tube. Since the battle group was still playing out the scenario, my jet was spun into the sixpack for a hot refuel and crew switch.

I started to pack up my charts and authenticator cards in hopes of hopping out when I saw that the relief crew consisted of a pilot only. The SDO was going to give me one of those once-in-a-lifetime good deals and let me bag another trap. I would have liked to decline the honor, but no one was giving me the option. So, while my new pilot climbed in, I

unpacked my bag and entertained myself by watching the rest of the recovery try to get back aboard.

The past couple of days had been spent in clear weather but very heavy swells. The boat was demonstrating the Dutch Roll that Nimitz-class CVs are famous for. Recoveries had been colorful. I watched an S-3 come into the groove and heard the LSO give him a "right for lineup" call. The deck was down, and I was sure that the Viking would bolter, but either the deck rose back up or he settled into a 4-wire. The pilot had never

made his correction to the right, so when he touched down (right of centerline, to boot) he kept going that way.

His right wingtip severed our extended refueling probe and threw the parts down our right intake. As we were only halfway through fueling, all the lines were under pressure. A spectacular geyser of fuel erupted from the hole where our probe had been. Suddenly, I found myself in a real-time egress situation.

I did one thing right. I keyed the ICS and shouted to the pilot, "Shut

everything off and let's get out of here!" It went downhill from there. I jerked the canopy handle open and started to unstrap and unhook, but I was delayed by my trusty kneeboard. I still had my original monstrosity left over from basic NFO school — you remember, the big black one with the built-in light and the clip on the strap with the tiny release button. I didn't want to climb out with that thing attached to my leg, especially with the usual stack of paper clipped to it, so I spent what seemed like an eternity trying to get it off. When I



finally did, my pilot was climbing down the boarding ladder. Already flustered and not wanting to be too far behind (it is better to die than to look bad), I scrambled out of the cockpit.

Once on the deck, I was confronted with part of the emergency that the checklist didn't cover – where to go from there? Firefighting and flight-deck crews were running everywhere, so I decided to get out of the way. I scurried straight to the catwalk and, once there, turned back to watch the show. I was rewarded with the sight of a crowd of flight-deck troops running straight at me. I tried to duck into a small compartment just off the catwalk, but it turned out to be the deck-edge AFFF station, which was where the firefighting crews were heading. I made myself as small as possible while they unwound the hose, and when they left I went out on deck again. The initial hubbub had settled down by this time. No fire had started, thanks to some quick work by our flight-deck chief and hose crews.

I climbed back up to the cockpit to

retrieve my gear, and then noticed that my ejection seat was still armed. Mentally kicking myself, I safed it and went back to the ready room.

In the days that followed, the lessons I'd learned about emergency egress were submerged under the weight of accident reports and LSO briefs about landing on a pitching deck. But I tried not to forget my own lessons, and I gave my egress procedures a critical review. For a start, I cut down by half the amount of charts, pubs and assorted garbage that I usually brought into the cockpit. I cut the metal catch off my kneeboard and used only the velcro strap. The first chance I got, I bartered for an Air Force model, which is little more than a sheet of plastic with an elastic strap.

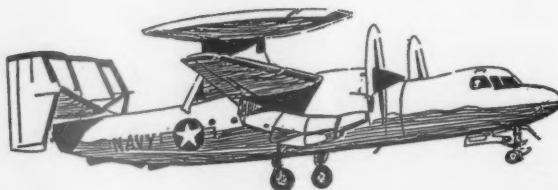
Most importantly, I learned where not to go in the catwalks during flight ops. From then on I made a point of getting straight off the flight deck once I got out of the jet after a shutdown. Maintenance and section debriefs could wait until everyone was back at the ready room. If I

wanted to watch, I joined the crowd on Vulture's Row.

The ground-egress procedure that we rattle off so quickly during boldface exams is never an emergency unto itself. Something else has gone wrong to make it necessary, and once you decide to get out, you have to shift from an inside to an outside scan. What's going on around you? Is there a fire? Can you go down the boarding ladder, or will you have to jump off the wing? Are you next to the deck edge or, worse yet, is the aircraft's tail over the water?

Once you get on deck, you have another problem. What is the quickest and safest way off the deck? If that route is blocked, do you have an alternate? One of the oldest sayings in aviation is that the flight's not over until the jet's in the chocks. Now I know that isn't always true. The flight might be over then, but the potential for accidents is still present. Almost anything can happen on the deck. Breathe a sigh of relief once you've trapped, but don't drop your guard.

LCdr. Lillard was with the precommissioning unit of USS Abraham Lincoln (CVN-72) when he wrote this article. He is now in VF-41.



A Numbers Game

By AD1 John A. Clawson

THE average human male stands 5 feet 9.5 inches, and weighs 165 pounds. An E-2C propeller is 13 feet 6 inches in diameter, and weighs 1,100 pounds.

A highly trained athlete in excellent condition can run the 40-yard dash in 4.4 seconds. The propeller, turning 1,106 revolutions per minute, moves 261.5 yards in one second.

If you were in a pickup football game, would you try to tackle someone with the size and speed of that spinning prop? Neither would I. Then why do we need to remind *anyone* about prop arcs?

AD1 Clawson is with VAW-121's QA Branch.

The Elevator Approach

"a religious experience"

By LCdr. Edward G. Abel

In the two hours since the sun set, we must have driven around the starboard-delta pattern a hundred times. We watched the newly-embarked Marines try to figure out what to do with a constantly-changing base recovery course. My crew and I, and our "killer Huey," had a hoist and a couple of smokes for our SAR duties. We felt pretty smug as we watched the new guys attack the learning curve for full-blown LHA night-ops with a low ceiling and no moon.

The AV-8B lead said, "Uncle," admitting that the ceiling was too low for the briefed mission, which killed the air assault. Recovery began. I told my copilot that I hoped we never had to go to war with a low ceiling just as the boss cleared us for the break — last as usual.

We cranked into a turn, and my copilot, on the inside of the turn, noticed that the nav lights had to be switched. He reached for the switch, but it didn't work. Then the wet crewman decided to contribute his two-cents worth and reached for a circuit

breaker. The crew chief started a discussion on the c/b location while the Boss yelled over the radio that my nav lights didn't jibe with the seat we had called.

At this point, I thought it would be better if everyone just sat on their hands until we got on deck. The copilot called for power in a pitch only a dog could hear. I pulled the collective up through my armpit and waited for the VSI to level out; it seemed to take forever. We were at 150 feet, climbing to 300 feet. I started to get vertigo and jumped on the gauges. I told my copilot to do the same while the crew looked for the ship. We seemed to be getting our crew coordination back.

Yes, we were a little high but we made an uneventful recovery. The Marines were waiting with open arms to ask me about my modified "elevator approach." I just called it "a religious experience." Crew coordination is just as important 30 seconds before touchdown as at any other point of the flight.

LCdr. Abel is the Safety Officer for USS *Peleliu* (LHA-5).



LETTERS

TECHNOLOGY AND SCIENCE
DETROIT PUBLIC LIBRARY

JUN 20 1990

Balloon

USS Defender (MCM-2) - As an avid reader of *Approach*, I would like to describe an item that might be useful to all Navy aircrewmembers. In 1985 I was fortunate enough to qualify for and fly in the back seat of TA-4J and TA-7C aircraft. Of course, my training included the use of safety equipment in the SV-2 survival vest and seatpan. Among these items was the PRC-90, pencil flares and the MK-13 smoke-flare. I believe a mylar balloon, 3 feet in diameter in International Orange, should be added to the kit.

The balloon would be attached to the SV-2 or life raft by a hook that many people use on their key chains. Imagine what an increase in reception and transmission the balloon would give your PRC-90 as it lifted 125 feet of antenna wire. The entire package (balloon, spool of wire, and inflation device - the same as the SV-2, only with helium cylinders instead of CO₂) would be small.

I read an article about two aviators who were in the water at night. They could see a cruiser but could not talk to the ship on their radio. A radar-reflective balloon would have been a great help in guiding the ship to the downed airmen. Even on a clear day in calm water, the ocean is a big place. Many aviators have seen rescue aircraft, but the people in the aircraft could not see them. A bright, orange balloon might get the rescue aircraft's attention as well as showing up on its radar. If the survivor is asleep in his raft, the balloon is still up and should be seen by any ship or aircraft in the area.

In the jungle, even when communication with rescuers has been accomplished, it is hard to direct a helicopter to the survivor. By inflating the balloon and raising it above the trees, your position is easily identified. When the helo approaches, you could simply lower the balloon to keep it from being a hazard to the aircraft.

STGC John E. Babcock

Correction

"Air Show Gone Sour" in the Oct '89 issue listed the author's previous command as HS-8. It should have been HS-7.

Standdown

FPO New York. - Having just participated in the 48-hour Navy-wide Safety Standdown, I was disturbed to see a photograph in a well-known, widely distributed service newspaper. The photo showed President Bush visiting one of our carriers. As he spoke to the ship's crew, he was surrounded by an attentive audience, some of whom were standing on the wings and fuselage of an aircraft. These people were not wearing protective equipment, (i.e., cranials) and it bothered me to see them placing themselves in danger as well as not showing a proper concern for their valuable aircraft.

Throughout most of my Navy career I have been trained to always wear a cranial when both feet are off the deck. Thank goodness the press does not have a working knowledge of our safety program; the headlines that might have resulted from this photograph could have been embarrassing.

AMS1 Brad J. Jewell

QAR Aviation Weapons Support Equipment
NAVWPNSFAC DET Machrihanish

A Fan of Approach

Reston, Va. - Since my father, George Haering, died last July, I no longer get to read *Approach*. How might I obtain a subscription to your publication I enjoy so much?

My father was elated when his quote on aircombat maneuvering appeared in your January issue.

George J. Haering

"It is a common belief that ACM is hazardous. It is potentially hazardous, but this is materially reduced by our current procedures, rigorous briefing, dissimilar aircraft and specialized adversary pilots. Safety is not a counter-argument to ACM. In fact, the reverse is true. Reducing ACM training not only reduces ACM competence, but also increases the prevalence of unplanned, unbriefed ACM or ACM-like maneuvers. The result of these two is more accidents."

● The quote appeared in our ACM special. His father, widely known in Naval Aviation, served

Approach welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: *Approach* Editor, Naval Safety Center, NAS Norfolk, VA 23511-5796. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

in OPNAV-962 from 1969 to 1982 when he moved to NAVAIRSYSCOM as Air-526. (*Approach* is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 at \$18 per year.) - Ed.

Re: Flippin' Switches (October '89)

Culver City, Ca. - This article says that two switches are set in close proximity to each other. But if they are both in identical positions during takeoff, a hazardous condition exists. Is there a reason that one of the switches can't be inverted so that they are in opposite positions? It seems that this configuration would be easier to feel with gloves, as well as to see.

Gary Burger

Re: Edge of the Envelope (January '90)

NAS Brunswick, Maine - I read and re-read Lt. Liske's story. I debated, wrote and re-wrote, procrastinated, and then said, "Yeah, I'd better write."

If the P-3 community has limited itself to teaching takeoffs by charts only, then "Murphy," hold onto your hat! The blame does not lie with the charts, the unexplained info from the FE, the pressure at the brake pucks or the tower-reported winds. The blame lies with the PPC!

Cdr. Rocky Freeman
Air Operations Officer

Cover Catch

USS Constellation (CV-64) - I just received the January '90 issue of *Approach*. The cover photo showing an E-2C launching from USS America (CV-66) is incorrectly identified. The ship is actually the Constellation. I enjoy reading *Approach* very much. Keep up the great work.

AS1(AW) S.A. Donivan
QAR AIMD/QA IM-1 Div.

● You're right, and thanks. - Ed.

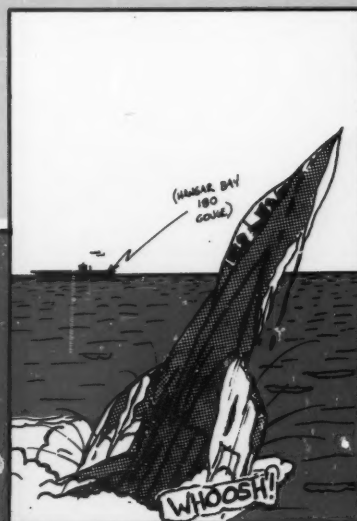
Belated thanks to:
Aviation Physiology Training Department
Naval Hospital Jacksonville
Branch Medical Clinic
NAS Cecil Field, Florida,
for the idea for the December '89
Approach cover. - Ed.

BROWNSHOES IN ACTION COMIX

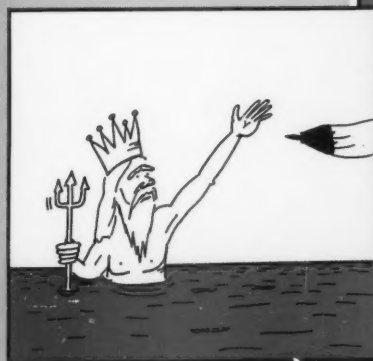
"The kind real aviators like"

By Lt. Ward Carroll

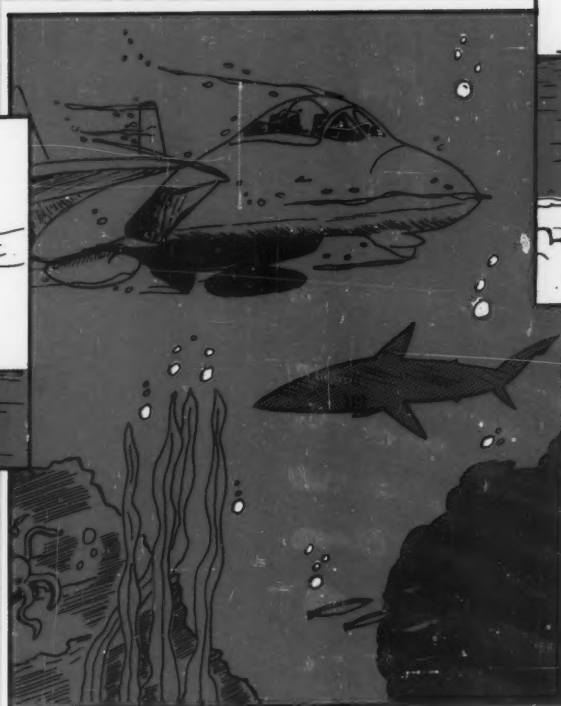
"The dream is
always the same."



"At recovery time, I break
through the surface at the 180
and fly a perfect pass to an OK-3
wire."



"Off the cat, I see King Neptune
beckoning to me on the horizon.
I fly into his gentle grasp and
sink beneath the surface..."



"I spend the entire cycle underwater,
at peace with the creatures of the deep..."

"Whew! Thanks for
letting me get that
out, Doc. I feel much
better."

"Oh, forget about it.
That's my job."



"Hello... Ops? This is fighter Doc.
I'm not going to be able to make that
hop with Dangerboy today... Right,
I'm hard down..."



**Put
your
visor
down
before
something
catches
your**

